SYSTEM AND METHOD FOR BALANCING AN INPUT DEVICE

[0001]   The present invention relates to system and method for balancing an input device such as a computer input device.

[0002]   According to Wikipedia, in computing, an input device is any peripheral (piece of computer hardware equipment) used to provide data and control signals to an information processing system such as a computer or other information appliance. Examples of input devices include keyboards, mouse, scanners, digital cameras and joysticks.

[0003]   There is a subgroup of pointing devices, which are input devices used to specify a position in space. Examples involving indirect input include mouse and trackball.

[0004]   Prior art publication of US 20100039381 A1 entitled "Rotatable input device" discloses a computer mouse that includes a surface tracking sensor that detects movement of the computer mouse along the support surface. Additionally included are one or more orientation sensors that detect a movement of the computer mouse relative to a pivot point. The computer mouse also includes a controller that is configured to translate the movement along the support surface into a two-dimensional coordinate and to translate the movement relative to the pivot point into a magnitude of rotation.

[0005]   The '381 publication presents the bottom surface of the mouse having a rounded shape in the form of a half oval. As a result of this rounded bottom, the mouse can "roll" relative to the support surface or relative to the mouse pivot point.

[0006]   Additionally, an orientation sensor is configured to detect a rotational movement of the mouse relative to one or more pivot points. That is, the orientation sensor is configured to detect the roll, pitch, and/or yaw of the mouse. A variety of orientation sensors may be used to detect such rotational movements. An example of an orientation sensor is a gyroscope used for measuring orientation or rotation based on detection of angular momentum. An example of a gyroscope is a vibrating structure gyroscope embodied in a micro electro-mechanical systems (MEMS) device. Another example of a gyroscope is a rotating gyroscope used to detect relative angular displacements and angular rates, which may be translated into a rotation of the mouse.

[0007]   The drawback of the '381 solution is that the mouse is only half oval, which reduces movement possibilities, especially roll, pitch, and/or yaw of the mouse.

[0008]   Moreover, the '381 defines such rounding that as any suitable degree needed to achieve a desired balance between stability of the mouse in an upright orientation, and ease of rolling the mouse.

[0009]   Thus a difficulty and unaddressed need is disclosed in '381 that precludes substantially spherical shapes of the mouse due to difficulties in achieving mouse balance and possibility of rolling off an inclined surface. From the viewpoint of a user, the balance must be present and the mouse (or an input device in general) needs to be resting on the desk, not self-rotating and lying perfectly balanced.

[0010]   It would be thus desirable to provide method and system for balancing an input device. Preferably such balancing system would be applicable for substantially spherical or spherical input devices such as spherical computer mouse.

[0011]   The object of the present invention is a system for balancing an input device, the system comprising: a spherical device having an outer spherical wall and an inner spherical wall the system further comprises: an internal circuitry module housing internal circuits and positioned in the center of the spherical device and balanced in the center in order hold the spherical device still on a flat surface; a cavity formed between the outer spherical wall and the inner spherical wall; a rheological fluid disposed in the cavity wherein the volume of the rheological fluid is below 50% of the volume of the cavity and such that the weight of the rheological fluid is above the weight of the spherical device without the rheological fluid; wherein at least one of the outer spherical wall and the inner spherical wall comprises a rheological fluid activation means configured to change the state of the rheological fluid; and a rheological fluid activation controller configured to control the rheological fluid activation means in response to occurrence of a predefined condition so that the spherical device may switch between a free rolling state and a fixed state.

[0012]   Preferably, the rheological fluid is an electrorheological fluid or a megnetorheological fluid.

[0013]   Preferably, in case of the electrorheological fluid the activation means are electrodes, while in case of the magnetorheological fluid the activation means are coils.

[0014]   Preferably, there are 8 activation means per perimeter on the inner wall and/or the outer wall.

[0015]   Preferably, the spherical device comprises an accelerometer based on the output of which the rheological fluid activation controller will determine which subset of the activation means shall be activated depending on the position of the spherical device.

[0016]   Preferably, the activation means are positioned adjacent each other.

[0017]   Preferably, the activation means are spread by a distance between them.

[0018]   Preferably, based on a vector of acceleration, determined from the output of the accelerometer, rheological fluid activation controller determines which activation means shall be activated in order to balance the spherical device.

[0019]   Preferably, the predefined condition is presence of an operators hand on the spherical device or lack thereof determined by an operator's hand detector configured to indicate whether an operator is holding the spherical device.

[0020]   Another object of the present invention is a method for balancing an input device, according to the present invention, the method comprising the steps of: awaiting detection of an operator's hand by the operator's hand detector; allowing a free flow of the rheological fluid within the cavity by instructing the rheological fluid activation controller to deactivate all activation means; awaiting detection of lack of contact with the operator's hand by the operator's hand detector; instructing the rheological fluid activation controller to activate selected activation means in order to make the rheological fluid solid.

[0021]   Another object of the present invention is a computer program comprising program code means for performing all the steps of the method according to the present invention when said program is run on a computer.

[0022]   Another object of the present invention is a computer readable medium storing computer-executable instructions performing all the steps of the method according to the present invention when executed on a computer.